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Carl F. Lorenzo* (Carl.F.Lorenzo@grc.nasa.gov), NASA Glenn Research Center, 21000 Brookpark Rd., MS-77-1, Cleveland, OH 44135, and **Tom T. Hartley**, The University of Akron, Akron, OH. *An Overview of the Fractional Exponential and Trigonometric Functions*. Preliminary report.

This paper presents the fundamental fractional differential equation and its solution; the fractional exponential function. Related historical functions which have been applied to the solution of fractional differential equations, including the Mittag-Leffler function, are also indicated. The R-function, a generalization of the fractional exponential function that also contains its fractional differintegrals, is presented.

The fractional (generalized) trigonometry and the fractional hyperboletry which are based on the R-function are summarized. The Laplace transforms of the fractional functions are also discussed. The fractional trigonometric functions are shown to be generalizations of the classical circular functions and the basis of the fractional spiral functions. Basic properties, such as the generalized Euler equations, and some generalized (fractional trigonometric) identities are expounded. Applications to the solution of fractional differential equations and potential physical applications such as the dynamics of spiral galaxies are discussed as time allows. (Received August 15, 2005)